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Polymer brushes

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The polymer brush is an ensemble of macromolecules end-tethered to a substrate. The so-called Alexander-de Gennes polymer brush model (S. Alexander, J. Physique 1977, and P.-G. de Gennes, Macromolecules 1980) opened a new field in polymer science and provided a theoretical framework to look at brush-like polymer systems. In this presentation, we will first briefly review the ideas and concepts behind the Alexander-de Gennes model of a planar polymer brush and summarize its major findings. We will then focus on the general impact of this seminal work by demonstrating numerous theoretical developments initiated by the Alexander-de Gennes model with specific emphasis on polyelectrolyte brushes and biological brush-like systems.